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Exotic properties and optimal control of quantum heat engine

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Abstract

© CopyrightEPLA, 2016.A quantum heat engine of a specific type is studied. This engine contains a single particle confined in the infinite square well potential with variable width and consists of three processes: the isoenergetic process (which has no classical analogs) as well as the isothermal and adiabatic processes. It is found that the engine possesses exotic properties in its performance. The efficiency takes the maximum value when the expansion ratio of the engine is appropriately set, and, in addition, the lower the temperature is, the higher the maximum efficiency becomes, highlighting aspects of the influence of quantum effects on thermodynamics. A comment is also made on the relevance of this engine to that of Carnot.

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